

RIVERS AND FLOODS.

At the close of February, 1900, the Upper Mississippi River was closed by ice as far south as the mouth of the Des Moines River, but during March it opened generally, commencing on the 8th at Hannibal, Mo. The latest date of opening was the 31st, at St. Paul, Minn. The only casualties accompanying the movement of the ice were a few of a minor nature at Davenport, Iowa. At the time of breaking up there were rapid rises in the water from Davenport, Iowa, southward, and at Keokuk, Iowa, a stage of 16 feet, or 1 foot above the danger line, was recorded in the early morning of the 12th. The last ice seen was at Dubuque, Iowa, on the 31st, while its southern limit was Cairo, Ill., at which place some floating ice was observed on the 1st and 2d.

In the Des Moines River the ice broke on the 11th, causing flood stages along its lower portion, and bottom lands on both the Iowa and Missouri sides of the river were overflowed.

Navigation was opened at Keokuk, Iowa, on the 18th; at Hannibal, Mo., on the 24th, and at Davenport, Iowa, on the 26th.

The Lower Mississippi River rose steadily after the 6th, and the average stages were from 8 to 11 feet greater than during February, 1900, except at New Orleans, La., where the increase was only about 6 feet.

In the Missouri River the ice at Omaha, Nebr., moved out on the 11th, and at Yankton and Pierre, S. D., on the 12th. On the 12th and 13th, respectively, navigation was resumed at Sioux City, Iowa, and Yankton, S. D.

At Kansas City, Mo., on the 9th, an ice gorge caused damage to an amount exceeding \$10,000 to Government work along the river.

The Illinois River and tributaries were at flood stage after the 10th of the month, and remained so at its close. The crest of the flood wave reached Peoria, Ill., on the 16th, and Beardstown, Ill., on the 18th. At both these places stages about 6 feet above the danger lines were recorded, and much damage resulted along the entire river. Mills were compelled to suspend operations, bridges were carried away, levees broken in some places, and thousands of acres of fine farming lands inundated.

Nothing of importance transpired along the Ohio River and tributaries. The average stages were a few feet higher than during February, the crests occurring during the first decade of the month. There was a decline during the second decade, followed by another rise during the third.

The rivers of the Middle Atlantic States were comparatively quiet. The situation along the Hudson became some-

what alarming on several occasions on account of the movement of ice gorges, but nothing serious occurred, and at the close of the month everything was in readiness for the opening of navigation.

Flood stages occurred on the Upper Susquehanna River on the 2d, lasting only for a day or two, however. At Wilkes-barre, Pa., traffic was somewhat obstructed by the high water.

There was a moderate flood in the James River on the 2d and 3d. Ample warning was given, and all movable property along the river removed to places of safety.

Heavy rains at intervals during the month caused decided temporary rises in the rivers of the South Atlantic States, and in a few instances danger-line stages were reached. Timely warning was given in all cases, and no avoidable loss occurred.

Accurate forecasts were also made of the flood stages which occurred in the Coosa River, Ala., on the 21st and 22d.

The Lower Tombigbee and the Black Warrior rivers were at a high stage throughout the month, and warnings of danger-line stages were issued on the 20th. The warnings were fully justified, the rise in the Tombigbee continuing until the 29th, when a stage of 47.6 feet was reached at Demopolis, Ala., 12.6 feet above the danger line. At Tuscaloosa, Ala., a stage of 51 feet was reached on the 20th, 8 feet above the danger line.

On the Pacific coast the principal occurrence of interest was the sudden rise in the Upper Sacramento River. At Red Bluff, Cal., there was a rise of 13.4 feet from the 7th to the 8th, and the danger-line stage of 23 feet was exceeded by 0.2 foot. The waters receded, however, almost as rapidly as they rose. The Lower Sacramento was also quite high throughout the month, but no flood stages were reported.

The highest and lowest water, mean stage, and monthly range at 131 river stations are given in Table XI. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

The thickness of ice in the rivers since December 4, 1899, is given in the following table. It will be noticed that there was a gradual decrease during March, 1900, and a total disappearance by the end of the month, except in the extreme north. At the corresponding period of March, 1899, there were 12 inches of ice as far south as Sioux City, Iowa, and 24 inches at Bismarck, N. D., whereas this year there was none.—H. C. Frankenfield, Forecast Official.

Thickness of ice in rivers (in inches), winter of 1899-1900.

Stations.	December.				January.					February.				March.			
	4	11	18	25	1	8	15	22	29	5	12	19	26	5	12	19	26
Moorhead, Minn.					12.0	19.0	31.0	24.0	36.0	30.0	32.0	38.0	36.5	36.5	36.5	36.0	26.0
Williston, N. Dak.	1.0	1.5	6.0	8.0	16.0	16.0	16.0	21.0	24.0	26.0	27.5	29.5	29.5	29.5	29.5	29.0	25.0
Bismarck, N. Dak.			1.5	9.0	16.0	17.0	17.0	15.0	17.0	17.0	22.0	25.0	26.0	26.0	23.0	23.0	
Pierre, S. Dak.			1.5	3.5	14.0	15.0	10.5	8.0	14.0	15.5	16.0	21.0	20.0	22.5			
Yankton, S. Dak.			5.0	7.0	10.0	11.0	10.5	8.5	10.0	11.5	14.5	15.5	20.0	22.0			
Sioux City, Iowa				1.5	10.0	8.0	6.0				14.0	16.0	18.0	19.0			
Omaha, Nebr.					10.0					6.0	12.0	15.0	17.0	14.0			
St. Paul, Minn.					12.5		20.0	16.0	18.0	20.0	22.0	23.0	24.0	24.0	22.0	22.0	20.0
La Crosse, Wis.				5.0	10.0	9.0	7.5	6.0	9.0	11.5	10.5	14.0	14.0	15.5	14.5	13.5	
Dubuque, Iowa			4.0	5.0	12.0	10.5	10.0			11.0	11.0	14.0	16.0	18.0			
Davenport, Iowa					8.0	9.0	6.0			10.0	10.0	15.0	17.0	17.5	16.0		
Keokuk, Iowa					10.0		5.0			8.0	0.0	12.0	11.0	9.0			
Hannibal, Mo.					8.0					4.0	0.0						
Topeka, Kans.					6.5							2.0	3.0				
Wichita, Kans.					2.0												
Pittsburg, Pa.					4.0												
Parkersburg, W. Va.					1.0	2.0											
Louisville, Ky.					5.0												
Columbus, Ohio					7.0	1.0			3.0	0.5		0.5	1.0				
New Brunswick, N. J.					6.0				2.5								
Bangor, Me.		2.0	2.0	4.5	8.0	9.0	12.0	14.0	14.0	14.0	17.0	17.0	16.0	16.0	16.0	16.0	14.0
Albany, N. Y.				4.0	5.0	8.5		2.5		8.0	7.5	2.0	4.0	6.0	5.0	8.0	
Harrisburg, Pa.					3.0	3.0				4.0							
Philadelphia, Pa.					2.0	2.0											
Washington, D. C.					5.0												
Lynchburg, Va.					4.0	2.0						0.5					